

1998

[illegible]

1970	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980	1981	1982	1983	1984	1985	1986	1987	1988	1989	1990	1991	1992	1993	1994	1995	1996	1997	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	2026	2027	2028	2029	2030	2031	2032	2033	2034	2035	2036	2037	2038	2039	2040	2041	2042	2043	2044	2045	2046	2047	2048	2049	2050	2051	2052	2053	2054	2055	2056	2057	2058	2059	2060	2061	2062	2063	2064	2065	2066	2067	2068	2069	2070	2071	2072	2073	2074	2075	2076	2077	2078	2079	2080	2081	2082	2083	2084	2085	2086	2087	2088	2089	2090	2091	2092	2093	2094	2095	2096	2097	2098	2099	2100	2101	2102	2103	2104	2105	2106	2107	2108	2109	2110	2111	2112	2113	2114	2115	2116	2117	2118	2119	2120	2121	2122	2123	2124	2125	2126	2127	2128	2129	2130	2131	2132	2133	2134	2135	2136	2137	2138	2139	2140	2141	2142	2143	2144	2145	2146	2147	2148	2149	2150	2151	2152	2153	2154	2155	2156	2157	2158	2159	2160	2161	2162	2163	2164	2165	2166	2167	2168	2169	2170	2171	2172	2173	2174	2175	2176	2177	2178	2179	2180	2181	2182	2183	2184	2185	2186	2187	2188	2189	2190	2191	2192	2193	2194	2195	2196	2197	2198	2199	2200	2201	2202	2203	2204	2205	2206	2207	2208	2209	2210	2211	2212	2213	2214	2215	2216	2217	2218	2219	2220	2221	2222	2223	2224	2225	2226	2227	2228	2229	2230	2231	2232	2233	2234	2235	2236	2237	2238	2239	2240	2241	2242	2243	2244	2245	2246	2247	2248	2249	2250	2251	2252	2253	2254	2255	2256	2257	2258	2259	2260	2261	2262	2263	2264	2265	2266	2267	2268	2269	2270	2271	2272	2273	2274	2275	2276	2277	2278	2279	2280	2281	2282	2283	2284	2285	2286	2287	2288	2289	2290	2291	2292	2293	2294	2295	2296	2297	2298	2299	2300	2301	2302	2303	2304	2305	2306	2307	2308	2309	2310	2311	2312	2313	2314	2315	2316	2317	2318	2319	2320	2321	2322	2323	2324	2325	2326	2327	2328	2329	2330	2331	2332	2333	2334	2335	2336	2337	2338	2339	2340	2341	2342	2343	2344	2345	2346	2347	2348	2349	2350	2351	2352	2353	2354	2355	2356	2357	2358	2359	2360	2361	2362	2363	2364	2365	2366	2367	2368	2369	2370	2371	2372	2373	2374	2375	2376	2377	2378</
------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	------	--------

[illegible]

described above, cooperation with banks which are sources of issuance of electronic money and/or credit companies which are sources of issuance of credit cards is necessary. Therefore, the system construction is not easy. It is to be noted that
5 a system which requires such cooperation with banks as mentioned above is disclosed in Japanese Patent Laid-Open No. 126231/1999.

SUMMARY OF THE INVENTION

It is an object of the present invention to provide a
10 payment acting service system and method by which a simple and easy electronic settlement system can be constructed only by communication undertakers.

In order to attain the object described above, according to an aspect of the present invention, there is provided a payment
15 acting service method for acting for a purchaser in settlement of a purchase price in a shop, comprising the steps of issuing a notification of a purchase price from a POS terminal provided in the shop to a mobile station carried by the purchaser, signaling, in response to a settlement starting instruction
20 of the purchaser who responds to the notification, a settlement starting request from the mobile station to authentication means through the POS terminal and a mobile communication network, performing an authentication process of the purchaser between the authentication means and the mobile station based on the
25 settlement starting request, signaling a settlement request from the authentication means to payment acting means when the

authentication indicates a correct result, and performing an accounting process of the mobile station by the payment acting means in response to the settlement request and issuing a notification of a result of the accounting process to the POS terminal and the mobile station.

The authentication means may use a user authentication function of an exchange provided for the mobile communication network. The payment acting means may use a charge collection function for the mobile station. Communication between the POS terminal and the mobile station and mobile communication network may be performed through a radio interface which can communicate by radio.

According to another aspect of the present invention, there is provided a payment acting service system for acting for a purchaser in settlement of a purchase price in a shop, comprising a POS terminal provided in the shop for issuing a notification of the purchase price to a mobile station carried by the purchaser and signaling a settlement starting request from the mobile station to a mobile communication network in response to a settlement starting instruction of the purchaser who responds to the notification, authentication means for receiving the settlement starting request through the mobile communication network to perform an authentication process of the purchaser with the mobile station and producing a settlement request when the authentication indicates a correct result, and payment acting means for performing an accounting process

of the mobile station in response to the settlement request and notifying the POS terminal and the mobile station of a result of the accounting process.

The authentication means may be a user authentication function of an exchange provided for the mobile communication network. The payment acting means may be a charge collection function for the mobile station. The POS terminal may have a radio interface which can communicate with the mobile station and the mobile communication network by radio.

According to the present invention, in order to construct a simple and easy electronic settlement system only by communication undertakers, a radio interface with a public mobile communication network and an interface with a mobile station are additionally provided for a POS (Point Of Sales) terminal so that an electronic settlement procedure between the mobile station and the public network is performed through the POS terminal. Further, an existing authentication function of an exchange in the public mobile communication network and an existing function for charge collection for performing an accounting process for a charge for service of a mobile station are utilized to perform a settlement process with the POS terminal. Thus, a simple and easy electronic settlement system can be constructed only by communication undertakers.

The payment acting service method and apparatus are advantageous in that banks and credit companies which have been considered as components of an electronic settlement system

are not necessary and an electronic settlement system can be constructed only from a public mobile communication network. Further, since a public mobile communication network which already has functions of user authentication and charge collection from users which are required by electronic settlement can be utilized as mechanisms for the functions, the payment acting service method and apparatus are advantageous also in that an electronic settlement system can be constructed with a low cost.

The above and other objects, features and advantages of the present invention will become apparent from the following description and the appended claims, taken in conjunction with the accompanying drawings in which like parts or elements are denoted by like reference symbols.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a schematic system diagram of a payment acting service system to which the present invention is applied;

FIG. 2 is a sequence diagram illustrating an operation procedure of the payment acting service system of FIG. 1; and

FIG. 3 is a sequence diagram illustrating an authentication procedure of a mobile station of the payment acting service system of FIG. 1.

DESCRIPTION OF THE PREFERRED EMBODIMENT

Referring first to FIG. 1, there is shown a configuration

of a payment acting service system to which the present invention is applied. The payment acting service system shown includes at least one mobile station 11 which is a subscriber to a public mobile communication service. The mobile station 11 has a high speed radio access interface such as the Bluetooth and has a function of transmitting a settlement request signal using the interface in response to an operation of keys (not shown) thereon by a user thereof.

The payment acting service system further includes at least one POS terminal 12. The POS terminal 12 has a radio interface with a public mobile communication network 13 and a high speed radio access interface such as the Bluetooth and can therefore communicate with the mobile station 11 and the public mobile communication network 13.

The public mobile communication network 13 includes at least one radio base station, at least one mobile communication exchange and so forth. A home location register (HLR) 14 for storing subscriber information of the mobile station 11 and so forth is connected to the public mobile communication network 13. Also a payment acting center 15 which performs a settlement process and issuance of receipt information in response to a request from the POS terminal 12 is connected to the public mobile communication network 13.

FIG. 2 illustrates operation of the system of FIG. 1. Now, a settlement procedure of a payment acting service of the payment acting service system described above is described with

reference to FIG. 2. If the user 11 who possesses the mobile station 11 purchases a commodity in a shop which holds the POS terminal 12, then a purchase price is inputted to the POS terminal 12 by a key inputting operation, a bar code inputting operation or the like by an employee. The POS terminal 12 receiving the price input notifies the mobile station 11 of the purchase price using the high speed radio access interface. Where the POS terminal 12 has an external display function such as a display unit, the notification of the price may be performed by displaying the price on the display unit.

When the mobile station 11 is notified of the purchase price from the POS terminal 12, it displays the price on a display section thereof. The user 11 will confirm the price displayed on the mobile station 11 or the POS terminal 12 and perform a settlement request by a key operation. The mobile station 11 receiving the settlement request instruction by the key operation of the mobile station 11 signals a settlement starting request signal to the POS terminal 12 using the high speed radio access interface. This signal includes a subscriber number (MSN: Mobile Subscriber Number) of the mobile station 11 in the public mobile communication network and a mobile station number (MSI: Mobile Subscriber Identifier).

The POS terminal 12 receiving the settlement request signal from the mobile station 11 transmits an origination request signal to the public mobile communication network 13. This signal includes the subscriber number (MSN), the mobile

station number (MSI) and a dial number (#A) of the payment acting center 15. An exchange (not particularly shown in FIG. 2) in the public mobile communication network 13 receiving the origination request signal from the POS terminal 12 performs an authentication information reading out request to the home location register 14 to acquire an authentication key which is authentication information of the mobile station 11 and signals an authentication request signal to the POS terminal 12. This signal includes a random number generated by the exchange of the public mobile communication network 13.

The POS terminal 12 receiving the authentication request signal from the exchange of the public mobile communication network 13 transmits an authentication request signal to the mobile station 11 using the high speed radio access interface. This signal includes the random number generated by the exchange of the public mobile communication network 13. The mobile station 11 receiving the authentication request signal from the POS terminal 12 performs an arithmetic operation process based on the random number included in the signal and the authentication key possessed by the mobile station 11 itself and transmits a result of the arithmetic operation as an authentication response signal to the POS terminal 12 using the high speed radio access interface.

The POS terminal 12 receiving the authentication response signal from the mobile station 11 transmits the result of the arithmetic operation from the mobile station 11 as an

authentication response signal to the public mobile communication network 13. The exchange of the public mobile communication network 13 receiving the authentication response signal from the POS terminal 12 performs authentication based
5 on the result of the arithmetic operation. If the exchange discriminates that the authentication is OK, then it performs a call connection process based on the dial number (#A) received from the POS terminal 12.

After completion of the connection process to the payment
10 acting center 15, the POS terminal 12 transmits a settlement request signal to the payment acting center 15. This signal includes the subscriber number (MSN) and accounting information representative of the price of the commodity purchased by the user 11. The payment acting center 15 receiving the settlement
15 request signal from the POS terminal 12 transmits an accounting process request signal to the home location register 14. This signal includes the subscriber number (MSN) and the accounting information.

The home location register 14 receiving the accounting
20 process request signal from the payment acting center 15 stores the accounting information for the subscriber number (MSN) included in the signal and transmits an accounting process response signal to the payment acting center 15. The payment acting center 15 receiving the accounting process response
25 signal from the home location register 14 produces receipt information to the mobile station 11 and transmits the receipt

information as a settlement response signal to the POS terminal 12. The POS terminal 12 receiving the settlement response signal transmits the received receipt information as a settlement completion signal to the mobile station 11 and then
5 disconnects the circuit to the payment acting center 15. Through the procedure described, the settlement procedure of the payment acting service according to the present invention is completed.

While the procedure for authentication between the mobile
10 station 11 and the exchange in the mobile communication network is well known in the art, the well-known authentication procedure is particularly illustrated in FIG. 3. Referring to FIG. 3, the subscriber number (MSN) and the mobile station number (MSI) of the mobile station 11 are represented MSN(A) and MSI(A),
15 respectively, and the authentication key of the mobile station 11 and the authentication key regarding the mobile station 11 registered in the home location register 14 are represented by A-MSN and A-MSI, respectively.

It is to be noted that, in FIG. 3, the POS terminal 12
20 of FIG. 1 is omitted, and the authentication procedure is illustrated as an authentication sequence for a common mobile station. The present invention utilizes an authentication function (possessed by an exchange) for such a common mobile station. Further, the accounting information (purchase price)
25 of the mobile station 11 is transmitted to and stored into the home location register 14 as an accounting process request signal

from the payment acting center 15. Thereafter, money for the purchase price is collected from the user making use of a charge collecting system function that a common public mobile communication network has.

5 While a preferred embodiment of the present invention has been described using specific terms, such description is for illustrative purposes only, and it is to be understood that changes and variations may be made without departing from the spirit or scope of the following claims.

10